

AWMP Ver 2 Model QA/QC						
Item	Date	Model / AWMP Version	Problem / Issue	Change (changes affecting input tables in BOLD)	Updated Model Version	Previous change, status in AWMP V3.0 Model
1	8/2/2012	MS V1.0 / AWMPV2.0	ERM found that the pH used in the model did not match that proposed in Version 2 of the AWMP	The Mine Site model was updated (email from Peter Hinck to Fred Marinelli on 7/19/12) to match AWMP V2. However, subsequent discussion of the AWMP modeling parameters has led to this change being dropped from the proposed model. Cat1SP_pH_Geomem no longer used in modeling	MS AWMPV2.1	Unchanged from V2.1
2	8/2/2012	MS V1.0 / AWMPV2.0	ERM identified a greater-than-expected mass removal in the Cat 1 PRB	This issue is associated with the percolation through the Category 1 geomembrane, which was updated in the 7/19/12 email submittal to match the distribution proposed in the AWMP V2. The design flow of the PRB was not updated at the same time, resulting in longer-than-intended retention times in the PRB, and therefore greater-than-intended mass removal. Cat1SP_PRB_Design_Flow value changed to 2.5 gpm	MS AWMPV2.1	Cat 1 PRB no longer modeled
3	8/2/2012	MS V1.0 / AWMPV2.0	Additional model outputs are necessary to facilitate the impacts analysis	Barr added additional results reporting and standards checking functionality in the surface water portion of the model.	MS AWMPV2.1	Additional outputs added
4	8/2/2012	MS V1.0 / AWMPV2.0	Barr found during internal QA/QC that the flow lines carrying wall rock mass to the West Pit in the flow chart were combined into one defined function in the model. Task 2 QA/QC needed those flow lines separated into water flows and direct mass transfers.	The functions, which were the addition of all wall rock flow lines for a rock category, were changed into 2 functions which separated mass flux in flowing water and direct transfers via wall rock inundation. These are now two distinct elements to facilitate the Task 2 QA/QC.	MS AWMPV2.1	Unchanged from V2.1
5	8/2/2012	MS V1.0 / AWMPV2.0	Barr found during internal QA/QC that the groundwater inflow to the West Pit was not properly accounted for in the water balance, although the mass balance was correct.	Barr corrected the West Pit water balance equations.	MS AWMPV2.1	Unchanged from V2.1
6	8/2/2012	MS V1.0 / AWMPV2.0	Barr found during internal QA/QC that the calculation of added alkalinity and calcium to the pit outflow as a result of pH adjustment in the limestone channel was not correct.	Barr updated the calculations relating to limestone dissolution.	MS AWMPV2.1	West Pit limestone / wetland treatment no longer modeled
7	8/2/2012	MS V1.0 / PS V1.0 / AWMPV2.0	Internal QA/QC has identified several small inconsistencies in the model flowcharts (not the models themselves).	Barr marked up the flowcharts used for the Task 2 QA/QC control volume identification.	MS AWMPV2.1 / PS AWMPV2.1	Updated for V3.0
8	8/2/2012	PS V1.0 / AWMPV2.0	Plant Site mass balance: first Plant Site control volume mass balance did not appear to close when using the initially provided flows and concentrations to calculate mass loading rates	Barr has shown (and discussed with Fred Marinelli on 8/1/12) that the model output flows and concentrations cannot be used to replicate GoldSim's mass loading results due to the complex differential equation solutions performed in GoldSim. An alternative means of performing the control volume calculations is to use GoldSim-reported water flow rates and GoldSim-reported constituent mass flux rates along with stored water volumes and constituent masses.	PS AWMPV2.1	
9	8/2/2012	PS V1.0 / AWMPV2.0	Barr could not do a direct comparison of Existing Conditions and Project Conditions without the two models being in one model. Critical for the impact analysis.	Barr incorporated the Existing Conditions Model INTO the Project (Base) model so that there is only 1 model to transfer now rather than 2 separate models.	PS AWMPV2.1	
10	8/2/2012	PS V1.0 / AWMPV2.0	Barr found during internal QA/QC that the defined volume in river nodes MLC-3 and MLC-2 were incorrect (MLC-3 referenced the MLC-2 volume and vice-versa).	Barr changed the volume definition of river nodes MLC-3 and MLC-2 in both the Project portion of the model and the Existing portion of the model.	PS AWMPV2.1	

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11	8/2/2012	PS V1.0 / AWMPV2.0	Barr found during internal QA/QC that 2 of the flow lines in the flow chart (surface runoff and tailings basin runoff to MLC-3) were combined into one defined function in the model. Task 2 QA/QC needed those two flow lines separate.	The function, which was the addition of two separate flow lines, was changed into 2 functions which separated runoff from natural areas and the tailings basin. These are now two distinct flow lines to facilitate the Task 2 QA/QC.	PS AWMPV2.1	
12	8/2/2012	PS V1.0 / AWMPV2.0	Barr found that the MODFLOW model of the FTB in closure did not match the AWMPV2.0 (reduced infiltration from the pond in Cell 1E/2E).	Barr updated the predictive MODFLOW simulation of the closure period and updated several tables of the work plan related to directions of flow and depths to the water table. Updated Plant Site tables 1-25, 1-27, 1-29, 1-31, 1-34, 1-35, 1-37, and 1-39.	PS AWMPV2.1	
13	8/8/2012	MS AWMPV2.1	Barr found during internal QA/QC that the West Pit outflow mass balance model combines the controlled outflow and any pit overtopping.	Barr changed the mass balance of the West Pit so that overtopping flows (unlikely) bypass the passive treatment and contribute directly to SW-004a.	MS AWMPV2.2	Unchanged from V2.2
14	8/8/2012	MS AWMPV2.1	Barr found during internal QA/QC that the West Pit surficial aquifer flow calculations contained an error in the flows for Section 2 (between Dunka Road and the Property Boundary).	Barr edited the cell flows vector calculation in the West Pit surficial aquifer (<code>\Flowpath_Models\WP_Surf\Cell_Flows\Flows</code>)	MS AWMPV2.2	Unchanged from V2.2
15	8/9/2012	MS AWMPV2.1	Based on comments from reviewers and Barr staff, PRB modeling was determined to be overly complicated.	Barr edited the modeling of the Category 1 stockpile PRB to be a constant removal efficiency (ex. 50% removal for SO4) irrespective of flow rates or retention time.	MS AWMPV2.2	Cat 1 PRB no longer modeled
16	8/10/2012	MS AWMPV2.1	During detailed West Pit treatment wetland design it was determined that the West Pit water elevation needs to be increased slightly.	Barr added a new variable representing the elevation that the West Pit water returns to after annual discharge. WP_Outlet_Elev_New value set to 1575' Barr also edited the equation for WP_Seasonal_Discharge to account for the current timestep inflows in calculating the desired outflow	MS AWMPV2.2	West Pit limestone / wetland treatment no longer modeled; elevation returned to previous value
17	8/15/2012	MS AWMPV2.2	Barr found during internal QA/QC that the East Pit wetland outflow to the surficial aquifer was defined differently in the flowpath and pit water balances	Barr edited the water balance calculation (EPCP_GW_Outflow) and aquifer (EP_at_Aquifer) to both initiate seepage when water levels reach the aquifer, without respect to pit pump-and-treat.	MS AWMPV2.3	Unchanged from V2.3
18	8/15/2012	PS AWMPV2.1	Mitigation measure at Tailings Basin	Barr has made significant edits to the features at the toes of the Tailings Basin, namely converting from a PRB system to a Wetland treatment system	PS AWMPV2.2	Unchanged from V2.2
19	8/15/2012	PS AWMPV2.1	Barr found during internal QA/QC that the inputs of Table 1-49 did not differentiate runoff area of the embankments of the existing Tailings Basin between Cell 2W and Cell 2E.	The areas which were under Cell 2W were divided into Cell 2W and Cell 2E. See Table 1-49.	PS AWMPV2.2	Unchanged from V2.2
20	8/15/2012	PS AWMPV2.1	During review of the tailings humidity cells, it was determined that the rates currently being used were not appropriate.	SRK suggested a new method and new distributions were created. These have not yet been checked by the agencies so the distributions are in the "proposal" stage; current distributions are as discussed with LAM on 9/28/12. See tables 1-13 and 1-14	PS AWMPV2.2	Updated for V3.0

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21	8/15/2012	PS AWMPV2.1	ERM found that the sulfate concentration cap for the tailings was not checking correctly. The calcium release rate was changed from a ratio to Na to a ratio to SO4 using CDF056. This change was captured in the release of Ca, but was not changed in the calculation of the sulfate cap.	The error in the model was fixed.	PS AWMPV2.2	Unchanged from V2.2
22	8/16/2012	MS AWMPV2.2	Barr found during internal QA/QC that the East Pit wetland overflow to the West Pit did not appropriately calculate flows during low-inflow periods.	Barr changed the calculation for EPCP_Wetland_Outflow so that outflow equals inflow if the starting water level for the month is equal to the outlet elevation.	MS AWMPV2.3	Unchanged from V2.3
23	8/16/2012	MS AWMPV2.2	Barr found during internal QA/QC that the flow lines carrying wall rock mass to the East Pit in the flow chart were combined into one defined function in the model. Task 2 QA/QC needed those flow lines separated into water flows and direct mass transfers.	The functions, which were the addition of all wall rock flow lines for a rock category, were changed into 5 functions which separated mass flux in flowing water and direct transfers via wall rock inundation to the 3 East Pit mass storage nodes. These are now 5 distinct elements to facilitate the Task 2 QA/QC.	MS AWMPV2.3	Unchanged from V2.3
24	8/16/2012	MS AWMPV2.2	Barr found during internal QA/QC that there was an inconsistency between the stockpile liner leakage flows used for the stockpile and GW flowpath water balances.	Barr changed the calculations for the source zone recharge ("S") terms for the following flowpaths: EPCat23_Surf, OSP_Surf, OSLA_Surf. Flow into the flowpath now equals the stockpile outflow rate.	MS AWMPV2.3	Unchanged from V2.3
25	8/21/2012	PS AWMPV2.3	Foth found an inconsistency between the plant site input tables and the model. The release rates for several constituents were defined using log-normal or discrete distributions rather than beta distributions as defined in the work plan (Tables 1-13 and 1-14).	The work plan tables are correct. The model was modified in anticipation of CDF056, which was later rejected. The values in the input tables were changed back, but the input distributions themselves were not changed back from log-normal and discrete distributions to beta distributions. The model has since been updated so that the release rates match the work plan input tables.	PS AWMPV3.0	
26	8/22/2012	MS AWMPV2.3	Based on recommendation from Agency staff it was determined that the sulfate wild rice standard has been applied at incorrect locations in the Partridge River.	Barr changed the locations where the wild rice standard applies in the model variable Wild_Rice_Locs to be only at SW-005. Updated Mine Site Tables 2-2 and 1-17.	MS AWMPV3.0	

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27	8/31/2012	MS AWMPV2.3	Based on decision to switch to mechanical treatment and constant discharge in post-closure, the model needs to be updated to remove non-mechanical treatment systems and alter the treatment system modeling.	Barr made major changes to the modeling of the WWTF and previous passive treatment systems to reflect the shift to long-term active treatment, including: * Category 1 stockpile PRB deactivated, inputs removed * West Pit controlled (seasonal) discharge deactivated * West Pit limestone/wetland treatment deactivated, inputs removed * Category 1 stockpile containment water balance revised; water routed to WWTF in operations/reclamation/long-term closure * Added detail to the WWTF water balance calculations * Added new triggers to define "reclamation" and "long-term" conditions, updated pit and Category 1 stockpile water balances to use new triggers * Added new mixing cells to represent reclamation and long-term WWTFs, updated pit and stockpile contaminant transport elements to direct flow to new cells * Updated pit, Category 1 stockpile, and WWTF mass balance checks * Updated Mine Site Tables 1-35, 1-36, and 1-37 (Plant Site flow and quality to West Pit). * Reclam_Pump_Total set at 2400 gpm * LongTerm_Pump_WP set at 600 gpm * EP_Return_Deficit set at 100 gpm * Retentate_Reclam set at 20%, Retentate_LongTerm set at 15% * Updated Mine Site Table 1-34 (WWTF targets)	MS AWMPV3.0	
28	9/17/2012	MS AWMPV2.3	Based on MODFLOW modeling of the Category 1 stockpile, some uncaptured seepage is expected to enter the West Pit even under 100% containment.	Barr changed the Category 1 stockpile water balance modeling to direct seepage "leaking" past the containment system to the West Pit. Cat1_Contain_Leak defined as 7% of total infiltration	MS AWMPV3.0	
29	9/21/2012	MS AWMPV2.1	Barr identified in response to agency questions that not all WWTF interactions between the Mine Site and Plant Site were accounted for in the WWTF water and mass balance.	Barr added an inflow of Plant Site brine (flow and chemistry) to the West EQ Pond and reclamation WWTF. Barr added an outflow of sludge water (flow) from the operations WWTF and (chemistry) from the CPS pond; and an outflow of sludge water (flow and chemistry) from the reclamation WWTF. New Mine Site Tables 1-38, 1-39, and 1-40 (Brine flow and quality). New input variable Sludge_Water_Out defined as 5 gpm.	MS AWMPV3.0	
30	9/21/2012	MS AWMPV2.3	The time of the West Pit overflow has changed to approximately year 40.	Barr changed the overflow year from 65 to 40 in the Partridge River flow tables. Updated Mine Site Tables 1-18, 1-20a through 1-20l and 1-21.	MS AWMPV3.0	
31	9/24/2012	MS AWMPV2.3	Agency staff requested that the background groundwater distributions be updated	Barr updated the distributions for the surficial groundwater quality (data through June 2012); subsequently Barr updated the surface water quality calibration. Updated Mine Site Tables 1-12 and 1-13	MS AWMPV3.0	
32	9/24/2012	MS AWMPV2.3	Partridge River concentration outputs were overly complicated	Barr changed the concentration summary calculations for the NoAction and NorthMet models	MS AWMPV3.0	
33	9/24/2012	MS AWMPV2.3	Internal QA/QC identified an unnecessary timestep in one of the input tables	Barr edited the West Pit footprint input table to remove the unnecessary timestep. Updated Mine Site Table 1-9b	MS AWMPV3.0	
34	9/24/2012	MS AWMPV2.3	Updated Plant Site modeling has changed the water quality available to flood the West Pit	Barr edited the West Pit water balance to identify the desired flow quantity and duration Updated Mine Site Tables 1-35, 1-36, and 1-37 (Plant Site flow and quality to West Pit) TB_Stop_Vol defined as 50,000 acre-ft	MS AWMPV3.0	
35	9/24/2012	MS AWMPV2.3	Based on MODFLOW modeling of the Category 1 stockpile, reclamation needs to begin earlier to avoid water table mounding beneath the stockpile	Barr changed the beginning of the 8-year reclamation period to the start of mine year 14 (t = 13 years). Updated Mine Site Table 1-5b	MS AWMPV3.0	

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36	9/28/2012	PS AWMPV2.3	No longer considering trees in Cell 2W to improve evaporation and reduce percolation	Changed the Current_2W_Evap element, moved the Use_Mitigation_Evap_in_2W element to the Inactive_Container, and modified the Precip_Budget elements of the coarse and fine tailings in Cell 2W of the project.	PS AWMPV3.0	
37	9/28/2012	PS AWMPV2.3		Changed the triggers of multiple switches in the Globals container to match the control of water flow.	PS AWMPV3.0	
38	9/28/2012	PS AWMPV2.3	No input that controls the drainage time of the Hydrometallurgical Residue Facility	HRF_Drainage_Period element added to control the draining and treating of the HRF. This input is added to the Work Plan Table 1-1. Also had to add functionality to the drainage from the HRF in closure to properly send the total volume to the WWTP over the drainage period.	PS AWMPV3.0	
39	9/28/2012	PS AWMPV2.3	Barr found that the magnesium concentration cap for the tailings was not checking correctly. The calcium release rate was changed from a ratio to Na to a ratio to SO4 using CDF056. This change was captured in the release of Ca, but was not changed in the calculation of the sulfate cap.	The Mg_Cap was corrected for both the Atmospheric and CO2 Enriched conditions. This is similar to the fix for the sulfate release cap error of Item 22.	PS AWMPV3.0	
40	9/28/2012	PS AWMPV2.3	Barr found errors in the constituent content of the LTVSMC tailings for multiple constituents.	An error was discovered in determining the mass content of some constituents (Al, Ca, Fe, K, Mg, Na, and S). The unit conversion from % to mg/kg was 10x off and was corrected. For S, the value was updated for data consistency with the constituent release ratios. The Work Plan table has been updated and highlighted. The element LTVSMC_Content was updated in the model.	PS AWMPV3.0	
41	9/28/2012	PS AWMPV2.3	Cleaning up the QA/QC folders	Multiple changes were made to the Inputs_Checking container to facilitate the Task 1 QA/QC that is coming up.	PS AWMPV3.0	
42	9/28/2012	PS AWMPV2.3	Missing a control for the total volume of water that can be sent to the Mine Site	Added element Max_Vol_To_Mine to the container \Project\MINE_SITE. Also added to the Work Plan Table 1-1 and highlighted.	PS AWMPV3.0	
43	9/28/2012	PS AWMPV2.3	Changes to the Project Description	Major changes were made to the containers Interception_System, FTB_WWTP, and Tailings_Basin_Toes to account for the updates to the collection plan, the treatment plan, and the distribution of treated/blended water.	PS AWMPV3.0	
44	9/28/2012	PS AWMPV2.0	Could not directly export flow and stored water values to spreadsheets during the Task 2 QA/QC review.	Added flow related elements to the unsaturated tailings portions of the model. Changed flow controls (outflow rates) of the mixing cells in the unsaturated tailings portions of the model. All of this was for the purpose of aiding the Task 2 QA/QC.	PS AWMPV3.0	
45	9/28/2012	PS AWMPV2.3	The model was applying inappropriate solubility limits to the unsaturated tailings portions of the Tailings Basin	Solubility controls were added to each of the unsaturated tailings portions of the models so that each mixing cell was referencing the correct solubility limit.	PS AWMPV3.0	
46	9/28/2012	PS AWMPV2.3	Elements that show up in the Existing and Project models that should be identical were both in the model independently as inputs.	Those few elements in \Project\Tailings_Basin\NorthMet_Basin\CELL_1E\Basin_Characteristics were cloned to prevent possible differences in the future.	PS AWMPV3.0	
47	9/28/2012	MS AWMPV2.3	Barr found during internal QA/QC that there was an over-release of constituents in the first timestep from all stockpiles, due to an attempt to prevent divide-by-zero errors.	Barr changed the calculations for the release rate terms throughout the model (stockpiles, pit walls, pit backfill) to release zero mass in the initial timestep when the previous "InRock" mass is zero. See model element \Stockpile_Models\Cat4SP_Model\Cat4SP_MassBal\Cat4SP_VFCat4SP_ReleaseVF_frac for an example.	MS AWMPV3.0 / PS AWMPV3.0	
48	9/28/2012	PS AWMPV2.3	During Task 2 QA/QC review, Barr found that the initial conditions of the existing basin did not seem correct.	Barr found that the initial conditions of the basin were not updated when CDF 055 was approved which changed the initial saturation conditions and necessarily changed the initial mass and loading rates. Initial values were modified.	PS AWMPV3.0	

